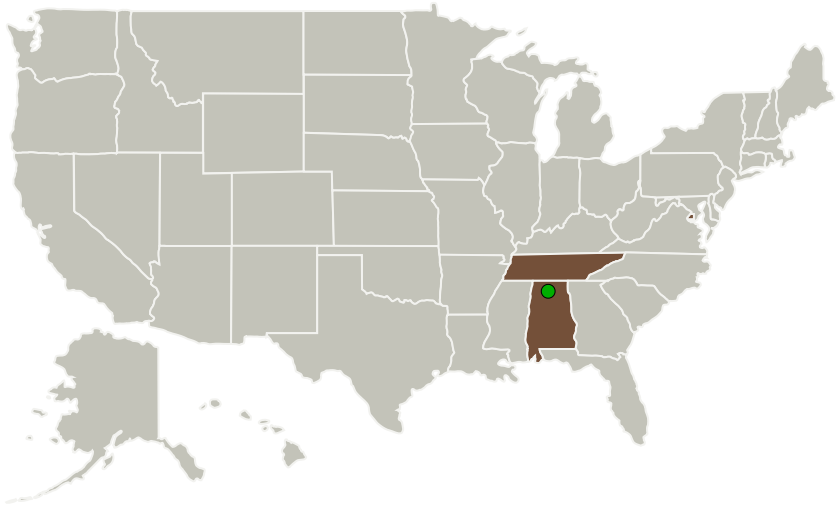
Low Cost Intermediate Stage for Affordable Nano/Micro Launch, Phase I

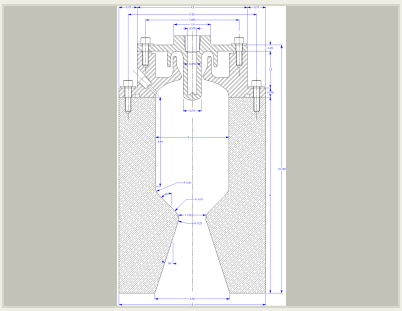
Completed Technology Project (2017 - 2018)

Project Introduction

NASA is extremely interested in developing small space launch capability. Small launchers are more sensitive to dry mass growth, more so then larger vehicles. Three stage launchers tend to be much more insensitive to Dry mass growth. The challenge then becomes how to meet strict cost targets when additional parts count increases. Use of Propane derived fuel helps reduce cost by allowing common bulkhead tanks w/o insulation. TGV proposes a DARPA funded Electrocycle Boost stage, and a NASA funded pressure fed Micro stage. upgrade NASA STTR funded nano-stage with 3,000 class pressure fed second stage ProPoly 50 engine. Goal: Provide flexible architecture to ensure success of TGV's 15,000 lb class first stage and 500 lbs class upper stage. Design and build engine in phase I. No avionics, strictly middle stage. Could be used for suborbital testing of small upper stages. Phase II: Test engine, build stage, fly.

Primary U.S. Work Locations and Key Partners





low cost intermediate stage for affordable nano/micro launch, Phase I Briefing Chart Image

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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
TGV Rockets, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Washington, District of Columbia
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama
The University of Tennessee-Knoxville(UT-K)	Supporting Organization	Academia	Knoxville, Tennessee

Primary U.S. Work Locations	
Alabama	District of Columbia
Tennessee	

Project Transitions

June 2017: Project Start

June 2018: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140834)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

TGV Rockets, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

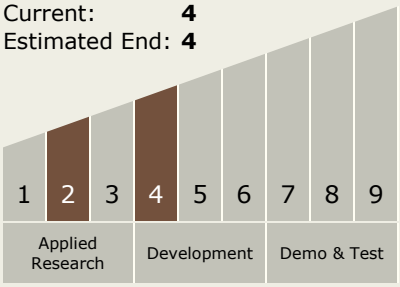
Carlos Torrez

Principal Investigator:

Earl W Renaud

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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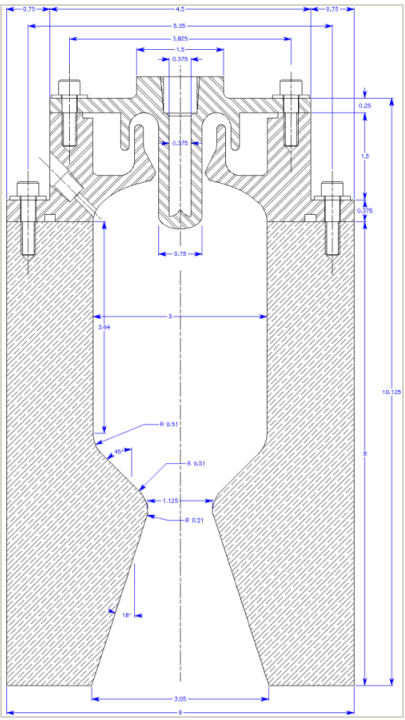
Images



Briefing Chart Image
low cost intermediate stage for affordable nano/micro launch, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/130366)*

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.1 Integrated Systems and Ancillary Technologies

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System